

Gulf of Saint Lawrence, the current velocity at 8 a. m. of the 24th being sixty-eight miles per hour.

VII.—As in the case of low area number v, the development of this disturbance over Arkansas and the southwest was preceded by continued low pressure over the Rio Grande Valley during the preceding forty-eight hours, but the storm track of this disturbance, as given on chart number i, starts with the first clearly defined cyclonic movement of winds, and barometric depression with progressive movement, observed upon the weather chart. This storm apparently owes its origin to the advance of an area of high pressure southward over the eastern slope of the Rocky Mountains, the cold air moving to the westward of the barometric trough which extended over the lower Mississippi valley on the 25th was attended by northerly winds over Kansas and Texas, while warm southerly winds prevailed over the Southern States, and these conditions were followed by a rapid development of this storm, which passed over the Ohio Valley, the middle Atlantic states, and the north New England coast, where it was central on the morning of the 27th. During the transit of this storm rains prevailed generally throughout the country east of the Rocky Mountains, except in the Northwest, which continued generally under the influence of the area of high pressure. The rainfall

was especially heavy in the central Mississippi and Ohio valleys and the lower lake region.

VIII and IX.—This storm appeared in the region north of Montana on the 26th, when the preceding storm was passing eastward over the upper Ohio valley. It moved southeastward over the upper Missouri valley on the 27th, followed by high northwesterly winds in the Dakotas, and reached the upper lake region on the afternoon of the 28th, where its course changed to the eastward. The 8 a. m. weather chart of the 29th exhibits this as a well-defined depression central over Lake Huron, bounded by the isobars of 29.80, 29.90, and 30.00. The succeeding report of this day shows a northeasterly movement of this depression with an apparent decrease of energy, and its centre could not be located after the afternoon report of this date, probably owing to the advance of low area number ix which passed rapidly from the region north of Montana to Lake Superior during the night of the 28–29th. The presence of low area number ix in the vicinity of Lake Superior when the preceding one covered the Saint Lawrence Valley, caused a decrease of barometric gradient between these disturbances, which resulted in their uniting north of the Lake region, and at the close of the month low area number ix covered the upper Saint Lawrence valley.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.			Duration.	Velocity per hour.	Maximum abnormal changes in pressure in twelve hours, with maximum abnormal changes in temperature and maximum wind velocities in connection therewith.									
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.				Rise.	Station.	Date.	Fall.	Station.	Date.	Miles per hour.	Direction.	Station.	Date.
High areas.																		
I.....	*28	54	117	37	72	6.0	20	.36		Denver, Colo.....	*31	31	Palestine, Tex.....	*31	42	nw.	Bismarck, N. Dak.....	*28
II.....	2	44	128	30	77	4.5	36	.56		Pittsburgh, Pa.....	5	20	Duluth, Minn.....	3	52	n.	Sandy Hook, N. J.....	5
III.....	7	37	126	32	77	5.0	37	.72		Swift Current, N. W. T.....	8	26	Cincinnati, Ohio.....	9	60	sw.	Winnemucca, Nev.....	7
IV.....	10	46	130	40	75	6.5	22	.72		Fort Sully, S. Dak.....	12	42	Calgary, N. W. T.....	10	52	ne.	Rapid City, S. Dak.....	8
V.....	17	55	89	30	75	6.5	13	.48		Swift Current, N. W. T.....	18	39	Qu'Appelle, N. W. T.....	18	44	s.	Moorhead, Minn.....	19
VI.....	22	48	130	48	56	5.0	33	.54		Port Arthur, Ont.....	23	28	Saint Vincent, Minn.....	22	48	ne.	Block Island, R. I.....	25
VIa.....	25	53	103	25	97	4.0	24	.32		Qu'Appelle, N. W. T.....	25	25	Abilene, Tex.....	24	48	n.	Abilene, Tex.....	25
Mean.....		48	118	35	76	5.4	26	.53				30			49			
Low areas.																		
I.....	2	32	97	43	59	3.0	40	.42		Des Moines, Iowa.....	3	20	Palestine, Tex.....	2	48	s.	Springfield, Ill.....	3
Ia.....	1	52	117	41	95	2.0	33	.38		Minnedosa, Man.....	1	17	Minnedosa, Man.....	1	36	sw.	Saint Louis, Mo.....	1
II.....	5	43	106	49	53	3.0	40	.46		Port Arthur, Ont.....	5	21	Cleveland, Ohio.....	6	42	nw.	Fort Assiniboine, Mont.	7
III.....	5	48	128	52	62	5.0	35	.54		Calgary, N. W. T.....	6	17	Swift Current, N. W. T.....	6	52	w.	Sandy Hook, N. J.....	7
IV.....	9	56	115	48	68	5.0	33	.50		Calgary, N. W. T.....	9	25	Milwaukee, Wis.....	8	52	sw.	Columbus, Ohio.....	9
V.....	16	33	93	39	71	1.5	41	.30		Norfolk, Va.....	17	13	Moorhead, Minn.....	10	64	w.	Buffalo, N. Y.....	9
VI.....	16	55	117	52	69	7.5	24	.30		Calgary, N. W. T.....	20	21	Atlanta, Ga.....	18	40	nw.	Fort Assiniboine, Mont.	10
VII.....	26	37	90	48	57	2.0	44	.40		Port Arthur, Ont.....	22	21	Helena, Mont.....	16	68	nw.	Sandy Hook, N. J.....	18
VIII.....	26	53	117	46	76	2.0	34	.40		Portland, Me.....	27	21	Abilene, Tex.....	25	42	se.	Anticosti Island, G. of S. L.	24
IX.....	28	55	118	47	75	2.0	48	.44		Milwaukee, Wis.....	28	17	Qu'Appelle, N. W. T.....	25	44	nw.	Corpus Christi, Tex.....	25
										Calgary, N. W. T.....	28	23	Swift Current, N. W. T.....	26	42	sw.	Fort Buford, N. Dak.....	27
										Duluth, Minn.....	29	23		28	46		Chicago, Ill.....	30
Mean.....		46	110	46	68	3.3	37	.41				20			48			

* March.

○ NORTH ATLANTIC STORMS FOR APRIL, 1890 (pressure in inches and millimetres; wind-force by Beaufort scale).

The paths of the depressions that appeared over the north Atlantic Ocean during April, 1890, are shown on chart i. These paths have been determined from international simultaneous observations by captains of ocean steamships and sailing vessels received through the co-operation of the Hydrographic Office, Navy Department, and the "New York Herald Weather Service."

Twelve depressions have been traced for April, 1890, the average number traced for the corresponding month of the last seven years being nine. The greatest number of depressions previously traced for April was thirteen, in 1886, and the least number was six, in 1883. Of the depressions traced for the current month, four were continuations of areas of low

pressure which first appeared over the North American continent; one was a continuation of depression number 10 for March, and was the storm traced and described as low area xi, within whose area the destructive tornadoes of March 27th occurred in the Ohio and middle Mississippi valleys; two apparently developed southeast of the Grand Banks; one first appeared south of Nova Scotia; two were first located west or southwest of the British Isles; and one advanced over mid-ocean in high latitudes. The depressions which advanced from the western Atlantic passed north of the region of observation before reaching the British Isles, and no storm-centres were located south of the thirty-fifth parallel.

The movements of areas of high pressure during the month were as follows: on the 2d an area of high pressure occupied

the middle Atlantic states, whence it had advanced from the upper lake region; on the 3d it occupied the ocean between the coast and Bermuda; on the 4th it was central over and northeast of Bermuda; and on the 5th it extended from south of the Grand Banks eastward to south of the Azores. During the 5th and 6th an area of high pressure moved from the upper Mississippi valley and the Lake region to the middle and south Atlantic coasts; on the 7th it occupied the ocean between the south Atlantic coast and Bermuda; and by the 8th had advanced eastward and was central over the Azores. From the 8th to the 11th the pressure continued high from the Grand Banks to the European coast south of the fiftieth parallel, and on the latter-named date an area of high pressure was central off the south Atlantic coast, whence it had advanced eastward over the Gulf States. By the 13th the area of high pressure which had extended eastward from the Grand Banks had contracted and occupied the ocean between the Banks of Newfoundland and the Azores, and the pressure continued high over the south Atlantic states. The relative positions of these areas of high pressure remained materially unchanged during the next three days, after which they apparently drifted to the southward and eastward. On the 16th an area of high pressure extended from the Lake region over New England and the northern part of the middle Atlantic states; on the 17th this area occupied but a limited area over the middle Atlantic states; and by the 18th it had disappeared by a decrease of pressure. On the 21st an area of high pressure extended from the lower lake region southward over the Atlantic coast states; on the 22d the pressure was highest over the south Atlantic states; by the 24th the area extended from the south Atlantic states northeastward to Newfoundland and eastward to the Azores; by the 25th this extensive area of high pressure had been divided by the development of a storm of limited area over the southern part of the Grand Banks, and the appearance of a slight depression on the middle Atlantic coast. On the 25th the pressure was high along and off the Atlantic coast and from Bermuda to the Azores. On the 27th the pressure was high from the Canadian Maritime Provinces southward; and by the 29th this area of high pressure had moved east and southeast to the Azores; whence it extended northwest to Newfoundland and westward to Bermuda by the 30th.

Compared with the corresponding month of the last seven years the depressions traced for the current month were in excess of the average number for April, and although unsettled and stormy weather prevailed throughout a greater part of the month, more especially over the western and eastern parts of the ocean, the gales reported were not unusually severe for the season.

Over the western part of the ocean the storm periods were the 1st and 2d, 5th to 9th, 11th to 16th, 18th, 19th, 25th, 26th, and 28th, the severest storms of the month occurring northeast of the Grand Banks on the 2d, and from the Gulf of Saint Lawrence eastward over Newfoundland and the Grand Banks from the 5th to 9th. Over mid-ocean the weather was stormy from the 1st to 5th, 17th to 20th, and 27th to 29th, the heaviest storms being noted on the 1st, 3d, 5th, 17th, 20th, and 27th. Over the eastern part of the ocean stormy weather prevailed on the 2d, 6th to 8th, 11th to 18th, 21st, 22d, 25th, 29th, and 30th, the principal storms of the month being noted southwest and west of the British Isles from the 11th to the 18th.

The following are brief descriptions of the depressions traced for April, 1890:

1.—This depression was a continuation of a storm which appeared on the north Pacific coast on March 25th, whence it moved southeastward to Colorado, and thence eastward over the middle Mississippi and Ohio valleys, the lower lake region, New York, and New England, and thence over Newfoundland to mid-ocean by the close of the month. The passage of this storm over the middle Mississippi and lower Ohio valleys during March 27th was attended by terrific and disastrous tornadoes. On April 1st the depression was central over mid-ocean in about N. 55°, with central pressure below 29.50 (749) and

heavy gales, whence it passed northeastward beyond the region of observation.

2.—This depression apparently developed south of Nova Scotia during the 1st, and moved thence to the northeast of the Grand Banks by the 2d, and to mid-ocean in about N. 55° by the 3d, after which it disappeared north of the region of observation. On the 2d pressure falling to about 29.40 (747) was reported over the northern part of the Grand Banks, and heavy gales prevailed in that region. On the 3d the pressure was below 29.50 (749), and fresh gales prevailed over mid-ocean.

3.—This depression first appeared southeast of the Banks of Newfoundland on the 4th, and passing thence rapidly northeastward disappeared beyond the region of observation after the 5th, without evidence of marked energy.

4.—This depression was a continuation of low area i, which passed eastward from the Gulf of Saint Lawrence during the 5th. By the 6th the storm was central south of Newfoundland, with pressure below 29.30 (744) and strong to whole gales over and near the Grand Banks. By the 7th the centre of depression moved northeastward to about the fiftieth parallel, with an apparent decrease of energy, after which it passed beyond the region of observation.

5.—This depression was a continuation of low area ii, which advanced eastward over New England and Nova Scotia during the 7th and on the morning of the 8th was central south of Newfoundland, with pressure falling to about 29.45 (748) and fresh to strong gales. By the 9th the storm-centre had apparently passed northeastward beyond the region of observation.

6.—This depression advanced to south of Nova Scotia, where it was central on the 11th, with pressure about 29.60 (752) and fresh gales, and where it remained nearly stationary until the 14th, without evidence of marked energy, after which it moved northeast to the south of Newfoundland by the 15th, where it was attended by strong gales, and thence to the north of the Grand Banks by the 16th, where a marked decrease in pressure and increase in energy were shown. During the 17th and 18th the depression moved eastward to about the twenty-second meridian, after which latter date it passed northward and probably united with depression number 10 which had advanced eastward into high latitudes. The irregular movements of this depression from the 11th to 14th were evidently due to the presence of an area of high pressure to the eastward of its position whereby its advance was obstructed. With the southeastward movement of this area of high pressure the storm-centre moved northeastward along the usual path of storms.

7.—The presence of an area of low pressure west of the British Isles was indicated by reports of the 12th, and on the 13th a well-defined storm was central southwest of Ireland, with central pressure falling to about 29.30 (744) and fresh to strong gales; by the 14th the depression had apparently moved southeastward into the Bay of Biscay, where pressure falling below 29.00 (737) and heavy gales were indicated. During the 15th and 16th the storm was apparently central over or east of the Bay of Biscay, attended by strong gales, after which it passed beyond the region of observation.

8.—This depression apparently developed southwest of the British Isles on the 17th, and thence moved eastward over the Bay of Biscay in the wake of depression number 7, with central pressure about 29.50 (749) and strong gales.

9.—This depression was a continuation of low area v, which passed off the middle Atlantic coast during the night of the 17-18th, and on the morning of the 18th was central northwest of Bermuda, with pressure falling to about 29.70 (754) and fresh gales. By the 19th the centre of depression had moved to the southeast of the Grand Banks, with a marked decrease in pressure and increase of energy. By the 20th it had advanced northeastward to the thirtieth parallel, with an apparent increase of strength, after which it passed rapidly northeastward and disappeared north of the British Isles.

10.—This depression was central on the 19th over mid-ocean north of the fifty-fifth parallel, whence it had apparently advanced from the westward. The depression possessed con-

siderable energy, but it was too far north to admit of plotting its path after the 19th with reports at hand.

11.—This depression apparently originated over or near the Grand Banks on the 25th, on which date pressure falling to about 29.80 (757) and fresh to strong gales were reported in that region. By the 26th the depression had changed its position but slightly, after which it moved rapidly northeastward with a marked increase in strength, and disappeared in the direction of Iceland after the 27th. A peculiarity of this depression was that it apparently developed within an area of high pressure which on the 24th extended from the Canadian Maritime Provinces to the Azores, and within the central part of which this depression had developed by the 25th, on which date a storm area of small diameter on the southeast edge of the Grand Banks was surrounded by high pressure.

12.—This depression was a continuation of low area vii, which passed north of east over the Gulf of Saint Lawrence during the 28th, with pressure about 29.60 (752) and fresh gales. By the 29th the depression had advanced east-northeast to the fortieth meridian, and thence passed eastward to the twentieth meridian by the 30th, with central pressure about 29.60 (752) and moderate to fresh gales.

OCEAN ICE IN APRIL.

The following table shows the southern and eastern limits of the region within which icebergs or field ice were reported for April, during the last eight years:

Southern limit.			Eastern limit.		
Month.	Lat. N.	Long. W.	Month.	Lat. N.	Long. W.
April, 1883	40 49	52 05	April, 1883	48 00	43 00
April, 1884	41 26	45 46	April, 1884	45 25	43 34
April, 1885	41 40	49 50	April, 1885	44 10	39 41
April, 1886	40 51	46 39	April, 1886	47 43	30 11
April, 1887	40 02	50 04	April, 1887	46 00	38 18
April, 1888	41 33	50 00	April, 1888	47 40	49 00
April, 1889	43 57	50 20	April, 1889	47 16	43 11
April, 1890	40 40	49 40	April, 1890	47 26	35 42

* Isolated iceberg.

Ice was reported about one degree south and about five degrees east of the average southern and eastern limits of Arctic ice for April. The southernmost ice reported was a large iceberg on the 1st, and the easternmost ice noted was two large icebergs on the 5th, in the positions given in the table. In but one year, 1887, has ice been reported farther south, and in but one year, 1886, has ice been reported farther east than for the current month. During the last decade of the month large quantities of field ice from the Gulf of Saint Lawrence seriously obstructed navigation from Cape Breton Island and the eastern coast of Nova Scotia to southern Newfoundland ports. Compared with the preceding month the southern limit of ice has been extended less than one degree, and the eastern limit about four degrees. Compared with the corresponding month of preceding years the aggregate quantity of ice reported for the current month was largely in excess of the average, and the area occupied by heavy icefields was larger than noted for April during the past seven years. The enormous quantity of ice along or near the trans-Atlantic steamship routes between the thirty-fifth and fifty-second meridians caused considerable delay and damage to shipping.

The following positions of icebergs and field ice reported for April, 1890, are shown on chart i by ruled shading:

1st.—N. 45° 17', W. 43° 44' to N. 44° 54', W. 44° 26', twenty-two bergs, ranging from forty to sixty feet high and one hundred to two hundred and fifty feet long; N. 42° 04', W. 50° 28', berg; passed field ice an hour later; N. 44° 48', W. 45° 10', four large flat bergs; N. 42° 42', W. 50° 24', a medium sized and three small bergs; N. 44° 35', W. 40° 50', three large bergs, many small bergs, and pieces of ice; N. 42° 57', W. 49° 51', moderate sized berg; N. 45° 17', W. 43° 30' to N. 45° 03', W. 44° 18', forty-nine bergs; N. 42° 40', W. 50° 36', berg; N. 44° 51', W. 45° 15', large berg; N. 40° 40', W. 49° 40', large berg.

2d.—N. 43° 55', W. 49° 02', large berg; N. 45° 14', W. 41° 50', three small bergs and floating ice; N. 44° 25', W. 40° 50', four bergs; N. 47° 20', W. 38° 30', flat berg, thirty feet high and one-quarter of a mile long; also a very large berg; N. 47° 26', W. 38° 38', two peaked bergs; N. 44° 56', W. 44° 25' to N. 45° 17', W. 43° 48', fifty-nine bergs, three of them being nearly a mile long and flat on top, the others smaller; N. 44° 58', W. 42° 31', five bergs and small pieces.

3d.—N. 42° 18', W. 50° 48', large berg; also three pieces of ice; N. 45°, W. 41°, seventeen bergs; N. 45° 12', W. 41° 58' to N. 45° 02', W. 42° 20', two bergs; N. 43° 47', W. 49° 26', three large bergs; N. 43° 28', W. 51° 04', large berg; N. 48°, W. 36°, nine bergs; a little to the southward and westward five smaller ones, and three very large bergs standing very high out of the water; N. 45° 13', W. 42° 54', large berg, with three pinnacles; N. 45°, W. 41°, seventeen bergs within twenty miles; N. 43° 10', W. 48° 07', small flat berg; N. 43° 51', W. 47° 22', large berg, with pinnacles at ends.

3d-4th.—N. 45° 12', W. 44° 35' to N. 44° 53', W. 45° 46', five bergs; N. 42° 50', W. 51° 05', three small bergs.

4th.—N. 44° 55', W. 42° 37' to N. 44° 51', W. 42° 45', two bergs; N. 42° 25', W. 50° 40', small low berg; N. 45° 23', W. 40° 50', large berg and several pieces of ice; N. 44° 49', W. 42° 16', two large and two small bergs; N. 43° 47', W. 47° 10', large berg; and to the westward a large berg a quarter of a mile long, also four smaller bergs and floes; N. 47° 12', W. 36° 12', four large and two small bergs; N. 47°, W. 39° 50' to N. 46° 20', W. 40° 10', twenty-five large and moderate sized bergs and pieces of ice; N. 42°, W. 49°, berg; N. 46° 01', W. 40° 09', seven medium bergs and detached pieces; N. 46° 34', W. 40°, large flat-topped bergs; N. 47° 06', W. 42°, twenty-three bergs; N. 45° 20', W. 44° 10' to N. 47° 30', W. 39° 58', forty-three bergs.

5th.—N. 42° 26', W. 51° 05', medium berg; N. 45° 23', W. 41° 36' to N. 45° 03', W. 42° 34', twenty-four bergs and pieces of ice; N. 42° 20', W. 51° 37', berg and field ice; N. 45°, W. 41° 50', two large bergs, one of them a mile long, and two small ones; N. 47° 30', W. 38° 46', one large and one small berg and pieces of ice; and sailing on a s. 50° w. course passed about forty bergs in eighty-six miles; N. 44° 18', W. 38° 30', three small bergs; N. 47° 26', W. 35° 42', two bergs; N. 47° 18', W. 36° 02', large berg; N. 43° 10', W. 37° 50', large berg; N. 46° 20', W. 54° 02', three large bergs.

6th.—N. 42° 40', W. 49° 48', small berg; N. 42° 35', W. 50° 55', large berg; N. 43° 22', W. 49° 04', several medium bergs and field ice; N. 42° 45', W. 50', large berg; N. 45° 46', W. 41° 43' to N. 45° 30', W. 42° 03', six large bergs; N. 44° 40', W. 44° 10', large berg; N. 45° 46', W. 40° 35', large berg, and two smaller ones; N. 45° 35', W. 41° 15', very large berg; N. 44° 56', W. 41° 41', an enormous flat-topped berg over two miles long; N. 45° 35', W. 41° 50' to N. 46° 31', W. 38° 22', twenty-two bergs and many pieces of ice; N. 44° 36', W. 44° 03' to N. 46° 08', W. 39° 47', one small and four large bergs.

8th.—N. 42° 45', W. 50° 05', berg; N. 42° 44', W. 51° 28', berg; N. 42° 48', W. 50° 02', a large berg; N. 45° 20', W. 40° 11', large berg; N. 45° 32', W. 44° 02', large berg; N. 46° 50', W. 38° 04', large berg; N. 45°, W. 40° 20', berg.

9th.—N. 47° 34', W. 39° 36', large berg, also a small one; N. 45° 03', W. 40°, large berg.

10th.—N. 44° 52', W. 43° 47', a large flat-topped berg; N. 44° 50', W. 44° 10', berg; N. 45°, W. 39° 42', three bergs; N. 44° 57', W. 39° 50', very large berg and two small ones; N. 47°, W. 38°, large berg; N. 44° 10', W. 48° 30', three large bergs; N. 43° 40', W. 55°, small berg; N. 46° 34', W. 56° 09', ice fields and small bergs in sight for several hours; N. 45° 50', W. 42°, medium size berg; N. 47° 15', W. 36° 25', two large bergs and several pieces.

10-12th.—N. 47° 23', W. 38° 30', a large berg; N. 45° 10', W. 43° 20', large berg.

11th.—N. 47° 03', W. 38° 02', two small bergs; N. 47° 05', W. 38° 16', small berg and several pieces of ice; N. 46° 26', W. 42° 55', berg.

12th.—N. 42° 13', W. 55° 02', berg; N. 47° 05', W. 45° 35', very large berg; N. 46° 12', W. 44° 24', small berg; N. 44° 29', W. 40° 10', large berg; N. 46° 04', W. 37° 35', berg; N. 47° 27', W. 37° 27', two bergs.

13th.—N. 44° 17', W. 40° 35', large berg; N. 45° 27', W. 44° 56', large berg.

14th.—N. 43° 39', W. 45°, three large bergs; N. 44°, W. 40° 19', large berg. N. 46° 39', W. 38° 48', four bergs and pieces.

15th.—N. 48° 48', W. 42° 17' to N. 48° 30', W. 44° 17', two large and two medium bergs and pieces of ice; N. 46° 36', W. 41° 24', a very large flat-topped berg and several pieces; N. 43° 43', W. 39° 32', large berg; N. 42°, W. 38° 25', bergs; N. 45° 20', W. 37° 30', bergs; N. 51° 10', W. 40° 05', bergs; N. 46° 10', W. 43°, bergs; N. 45° 50', W. 48°, bergs.

16th.—N. 45° 02', W. 52° 05', pieces of ice; N. 43° 41', W. 39° 30', two small bergs; N. 46° 57', W. 41° 20', six bergs within thirty miles.

17th.—N. 43° 20', W. 49° 01', small berg and pieces; N. 43° 08', W. 50° 59', large berg with two very high peaks; N. 47°, W. 41° 35', large berg; N. 45° 30', W. 52°, bergs.

17-18th.—N. 50° 20', W. 37° 05' to N. 49° 06', W. 44° 14', seven large bergs; N. 47° 30', W. 40°, large berg; N. 47°, W. 43°, large berg and small pieces.

18th.—N. 43° 16', W. 49° 16', small berg and a piece of ice; N. 46° 31', W. 41° 35', large berg with small peaks; N. 42° 40', W. 50° 25', berg with four high peaks; N. 44° 30', W. 53° 30', bergs; N. 52° 05', W. 41° 05', bergs.

19th.—N. 43°, W. 50° 10', bergs; N. 43° 20', W. 48°, two small bergs; N. 48° 27', W. 45° 35' to N. 47° 54', W. 47° 45', field ice and numerous bergs.

20th.—N. 44° 28', W. 43° 33', small berg; N. 45° 20', W. 59° 10', field ice; N. 46° 35', W. 43° 08', two bergs; N. 47° 20', W. 39° 55', berg.

21st.—N. 43° 34', W. 49° 06' to N. 43° 22', W. 50° 36', small bergs; N. 43° 20', W. 51° 02', large flat-topped berg and a very large berg with two peaks, and some lumps of ice; N. 44° 15', W. 45° 10', large berg; N. 51° 22', W. 43° 32', berg; N. 45° 50', W. 45° 26', large berg; N. 47° 02', W. 58° 43', large field of broken ice; Cape Ray bearing east, six miles, another very large field of ice; after the first fifteen miles, ice grew much thicker and more closely packed and rafted; communicated with a steam sealer, which reported ice as far as could be seen from aloft; 24th, failed to make further progress and returned to open water; while cruising off Cape Ray, found the ice breaking up fast and drifting southeasterly; 27th, steered west from Cape Ray through broken and loose ice; entered clear water, Saint Paul's bearing southwest by south, eighteen miles.

21st-22d.—N. 45° 28', W. 42° 31' to N. 45° 59', W. 41° 25', bergs and detached pieces of ice.

22d.—N. 43° 05', W. 49° 41', block of ice 20 feet high and 60 feet long, and several pieces of ice; N. 44° 37', W. 49° 45', small pieces of ice; N. 49° 28', W. 39° 37', large berg; N. 49° 12', W. 40° 29', large and small bergs; N. 46° 10', W. 41° 20' to N. 46° 35', W. 40° 32', thirty bergs and quantity of pieces; N. 45° 15', W. 39° 55', bergs; N. 43°, W. 50° 45', bergs.

23d.—N. 49° 33', W. 38° 52', berg; N. 49° 10', W. 40° 15', berg; N. 47° 44', W. 47° 31', drift ice and small bergs; N. 45°, W. 40°, five bergs; N. 46° 26', W. 40° 50', large and small bergs. The ice at Cape Rouge is moving out of the Saint Lawrence River. A telegram from Quebec stated that the steamer "Lake Nepigon" was fast in the ice off Cape Ray, N. F.; N. 45° 15', W. 40° 25' to N. 45° 08', W. 40° 47', four bergs; N. 45° 03', W. 40° 14', several bergs; N. 45° 14', W. 40° 19' to N. 44° 56', W. 41° 09', ten large and several small bergs; N. 48° 32', W. 49° 10', field ice; N. 46° 26', W. 40° 50', one large and several small bergs.

24th.—N. 45° 20', W. 39° 52', field ice and one large and several small bergs; N. 44° 50', W. 40° 42', two large bergs, 1,500 feet long, 50 feet high, flat on top; N. 45° 22', W. 40° 21', four bergs; N. 45° 16', W. 40° 30', three large bergs; N. 45° 14', W. 40° 19' to N. 44° 56', W. 41° 09', ten large and

several small bergs; N. 45° 07', W. 40° 06' to N. 44° 38', W. 41° 02', twenty-seven bergs; N. 48° 09', W. 42° 42', berg; N. 47° 33', W. 44° 36', three bergs; N. 47°, W. 45° 16', berg; N. 47° 20', W. 39° 55', berg.

25th.—N. 45° 25', W. 58°, field ice; N. 47° 48', W. 39° 57', large berg; N. 45° 19', W. 40° 17', three large bergs, one nearly a mile long; N. 42° 30', W. 49° 20', several pieces of ice; N. 47° 44', W. 39° 13' to N. 47° 31', W. 39° 43', twelve large bergs and pieces of ice; N. 46° 52', W. 40° 50', large berg; N. 43° 01', W. 50° 49', two very large bergs; N. 42° 48', W. 48° 04', small berg. The bark "Maitland," from Buenos Ayres for Sydney, C. B. I., was prevented from getting within fifty miles of Sydney by ice, and had to put in at Halifax, N. S.; N. 46° 15', W. 42° 42', large berg; N. 44° 30', W. 52°, bergs.

26th.—N. 42° 13', W. 50° 37', two bergs; N. 45° 10', W. 39° 27', berg; N. 45° 16', W. 39° 52', berg; N. 45° 21', W. 39° 37', berg; N. 45° 30', W. 39° 30', four bergs; N. 44° 20', W. 41°, berg; N. 46° 16', W. 41° 15', very large berg; N. 42° 22', W. 50° 06', berg; N. 42° 17', W. 49° 58', two small bergs.

27th.—N. 42° 47', W. 51° 30' to N. 42° 47', W. 51° 57', two large bergs; N. 44° 36', W. 40° 38', berg; N. 47° 07', W. 60°, field ice; N. 43° 33', W. 49° 35', large berg; N. 43° 19', W. 49° 48', large berg; N. 44° 02', W. 41°, very large berg; N. 44° 20', W. 41°, berg; N. 46°, W. 44° 56', large quantity of field ice; N. 45° 19', W. 39° 04', berg; N. 45° 22', W. 38° 50', three bergs; N. 44° 30', W. 61°, field ice.

28th.—N. 45° 18', W. 38° 16' to N. 45°, W. 39° 10', thirty bergs; off Cape George, loose field ice extending about four miles southwest; N. 47° 06', W. 58° 40' to Cape Ray, field ice; N. 44°, W. 40° to N. 45°, W. 39', thirty-five bergs.

29th.—N. 44° 51', W. 38° 42', small and large bergs; N. 45° 14', W. 39°, berg; at entrance of the Gulf of Saint Lawrence from W. 58° to W. 60° 20', very large field of ice; N. 45° 28', W. 38° 35', low berg.

30th.—N. 46° 52', W. 36° 55', large berg; N. 42° 13', W. 52° 38', large berg.

FOG IN APRIL.

The following are limits of fog-areas on the north Atlantic Ocean, west of the fortieth meridian, for April, 1890, as reported by shipmasters:

Date.	Entered.			Cleared.			Date.	Entered.			Cleared.		
	Lat.	N.	Lon. W.	Lat.	N.	Lon. W.		Lat.	N.	Lon. W.	Lat.	N.	Lon. W.
5	41	40	49 25	41	35	49 40	14-15	43	00	48 30	42	40	49 50
5	39	52	71 04	39	47	71 17	15	40	45	64 45	40	35	67 05
5	40	36	64 56	40	36	65 25	24	40	32	70 35	40	25	72 15
5	44	20	45 12	44	10	45 50	25	40	57	63 00	40	46	64 30
6	42	17	52 40	42	17	53 30	25	47	48	42 40	47	18	44 45
9	41	00	66 22	40	25	69 29	25	47	48	42 40	47	18	44 45
9-10	41	40	61 20	41	33	63 57	25-26	43	01	48 10	42	31	73 12
10-11	45	58	56 34	43	15	57 45	26	42	49	50 58	42	24	49 49
10-11	41	48	57 20	41	10	63 24	26	42	49	50 58	42	24	49 49
11	42	11	48 53	41	24	52 31	27	41	58	60 40	41	44	46 36
12	41	14	56 50	41	06	58 15	27	40	43	67 22	40	28	62 27
12	41	00	48 57	40	37	49 36	28	42	00	50 00	42	00	73 14
13	40	57	60 57	40	48	63 12	28	40	57	65 46	40	49	50 30
13-14	44	13	43 04	43	36	44 55	28	42	19	57 50	42	08	66 39
14	41	25	52 04	41	30	49 00	30	40	28	68 57	40	14	59 56
14	40	24	62 19	40	02	69 44	30	42	50	47 10	42	30	48 00

The limits of fog belts west of the fortieth meridian are shown on chart i by dotted shading. In the vicinity of the Banks of Newfoundland fog was reported on eleven dates; between the fifty-fifth and sixty-fifth meridians on eleven dates; and west of the sixty-fifth meridian on nine dates. Compared with the corresponding month of the last two years the dates of occurrence of fog near the Banks of Newfoundland were nine less than the average; between the fifty-fifth and sixty-fifth meridians one less than the average; and west of the sixty-fifth meridian five less than the average. In each instance fog was reported in the regions referred to attending the approach or passage to the northward of low pressure storms. On the 9th dense fog was reported along the coast

from Massachusetts to Philadelphia, Pa., with the passage of a low pressure storm of pronounced strength from the Lake region to the Saint Lawrence Valley, and on the 27th dense

fog prevailed from Massachusetts southward along the middle Atlantic coast with the passage of a low pressure storm from Pennsylvania east-northeast over New York and New England.

TEMPERATURE OF THE AIR (expressed in degrees, Fahrenheit).

The distribution of mean temperature over the United States and Canada for April, 1890, is exhibited on chart ii by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Signal Service. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the departure is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Signal Service represents the mean of the maximum and minimum temperatures.

The mean temperature for April, 1890, was highest in extreme southern Florida and in the lower Rio Grande valley, where it was above 75°, and the mean values were above 70° over the Florida Peninsula, along the immediate Gulf coast from the Mississippi River to Galveston, Tex., in the Rio Grande Valley east of the one hundred and fourth meridian, in the lower Gila valley, Arizona, and in the valley of the Colorado River northward to extreme southern Nevada. The mean readings were above 60° south of a line traced from east-central North Carolina irregularly westward to the southern part of the Panhandle of Texas, thence southwestward to southeastern New Mexico, thence westward to southeastern Arizona, and thence northwest to the lower valley of the San Joaquin River, California, in the interior of southern California, save along the immediate coast, and at Sacramento, Cal. The mean temperature was lowest at the more elevated stations in west-central Colorado, where it fell below 30°, and the mean values were below 35° in the lower Saint Lawrence valley, along the west coast of the Gulf of Saint Lawrence, and at stations on the north shore of Lake Superior. The mean readings were below 40° north of a line traced from extreme southeastern Maine irregularly westward to central lower Michigan, thence northwestward to southern Manitoba, and thence north of west over the British Possessions north of Montana. The mean temperature also fell below 40° in western Wyoming and the adjacent part of Idaho, in south-central Utah, and east-central Nevada.

The mean temperature was above the normal, save in parts of eastern New England and the Canadian Maritime Provinces, in the Florida Peninsula, from the Rio Grande Valley north-eastward to extreme western Tennessee and northward to eastern Colorado, along the immediate south and middle Pacific coasts, from the north Pacific coast and the Columbia Valley northeastward over the British Possessions north of Montana, and at Chicago, Ill. The greatest departures above the normal temperature were noted on the coast of east-central North Carolina, and within an area extending from Saint Vincent, Minn., to Bismarck, N. Dak., where they exceeded 5°, and the departures above the normal temperature were more than 3° within an area extending from central Pennsylvania to northeastern West Virginia, in north-central Ontario, from west-central Ohio westward to central Illinois, in northern upper Michigan, from north Dakota and western Minnesota southward over northwestern Iowa and the eastern part of the middle Missouri valley, and within a limited area in southeastern Arizona. The most marked departures below the normal temperature were reported on the north Pacific coast, where, at Tatoosh Island, Wash., seven years record, the mean temperature was more than 6° below the average for the month, and the departures below the normal equalled or exceeded 2° along the north Pacific coast, in the western Saskatchewan

valley, and from south-central Indian Territory southward to southeastern Texas.

The following are some of the most marked departures from the normal at the older established stations:

Above normal.		Below normal.	
	°		°
Bismarck, N. Dak.	5.8	Tatoosh Island, Wash.	6.2
Kitty Hawk, N. C.	5.8	Fort Sill, Ind. T.	2.2
Fort Thomas, Ariz.	3.6	Calgary, N. W. T.	2.0
Marquette, Mich.	3.2	Portland, Me.	1.9
New York City.	3.0	Key West, Fla.	1.8
Helena, Mont.	2.6	San Francisco, Cal.	1.2

At Kitty Hawk, N. C., sixteen years record, the mean temperature for the current month, 60° 8, was 1° 7 higher than the highest mean temperature previously reported for April, noted in 1878; at Des Moines, Iowa, twelve years record, the mean, 52° 8, was 0° 1 above the April mean of 1886; and at Omaha, Nebr., twenty years record, the mean, 55° 2, was 0° 6 above the highest previous April mean, noted in 1878.

DEVIATIONS FROM NORMAL TEMPERATURES.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for April for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for April, 1890; (4) the departure of the current month from the normal; (5) and the extreme monthly means for April, during the period of observation and the years of occurrence:

State and station.	County.	(1) Normal for the month of April.	(2) Length of record.	(3) Mean for April, 1890.	(4) Departure from normal.	(5) Extreme monthly mean temperature for April.			
						Highest.	Year.	Lowest.	Year.
<i>Arkansas.</i>		°	Years	°	°	°		°	
Lead Hill	Boone	62.0	8	62.4	+ 0.4	65.3	1888	56.7	1884
<i>California.</i>									
Sacramento	Sacramento	59.3	37	55.3	- 4.0	63.3	1857	54.6	1860
<i>Connecticut.</i>									
Middletown	Middlesex	45.5	23	46.9	+ 1.4	50.9	1865	38.3	1874
<i>Florida.</i>									
Merritt's Island	Brevard	68.1	7	73.4	+ 5.3	74.9	1885	60.0	1889
<i>Georgia.</i>									
Forsyth	Monroe	64.9	16	66.7	+ 1.8	68.8	1888	61.0	1875
<i>Illinois.</i>									
Peoria	Peoria	52.4	34	55.8	+ 3.4	57.9	1878	40.6	1857
Riley	McHenry	44.6	34	46.0	+ 1.4	52.2	1856	35.5	1874
<i>Indiana.</i>									
Vevay	Switzerland	55.0	23	56.6	+ 1.6	60.5	1866	47.4	1874
<i>Iowa.</i>									
Cresco	Howard	43.0	18	47.3	+ 4.3	47.3	1878	37.5	1874
Monticello	Jones	48.2	36	50.9	+ 2.7	56.0	1855	38.0	1857
Logan	Harrison	50.2	16	56.2	+ 6.0	56.2	1890	42.6	1874
<i>Kansas.</i>									
Lawrence	Douglas	54.5	22	56.6	+ 2.1	59.6	1876	47.7	1874
<i>Louisiana.</i>									
Grand Coteau	Saint Landry	69.7	7	70.0	+ 0.3	70.9	1885	68.6	1884
<i>Maine.</i>									
Orono	Penobscot	39.8	20	40.2	+ 0.4	45.1	1889	33.3	1874
<i>Maryland.</i>									
Cumberland	Allegany	48.7	31	51.8	+ 3.1	57.6	1881	42.2	1859
<i>Massachusetts.</i>									
Amherst	Hampshire	45.4	54	46.6	+ 1.2	52.2	1839, '78	38.3	1874
Newburyport	Essex	43.9	10	44.9	+ 1.0	47.5	1886	41.4	1888
Somerset	Bristol	45.2	17	47.5	+ 2.3	51.8	1878	38.7	1874
<i>Michigan.</i>									
Kalamazoo	Kalamazoo	46.7	13	49.4	+ 2.7	52.9	1878	42.0	1881
Thornville	Lapeer	45.6	13	46.0	+ 0.4	52.1	1878	42.3	1881, '88
<i>Minnesota.</i>									
Minneapolis	Hennepin	43.3	24	47.5	+ 4.2	49.2	1886	36.6	1874
<i>Montana.</i>									
Fort Shaw	Lewis & Clarke	44.7	20	45.3	+ 0.6	51.2	1870	38.6	1882
<i>New Hampshire.</i>									
Hanover	Grafton	41.2	55	41.5	+ 0.3	46.9	1887	33.7	1874
<i>New Jersey.</i>									
Moorestown	Burlington	49.3	26	49.7	+ 0.4	55.1	1865	42.3	1874
South Orange	Essex	47.6	19	49.0	+ 1.4	52.9	1878	42.2	1874